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Image of Interest

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Thyroid Inferno: The "flames' of Graves' Disease

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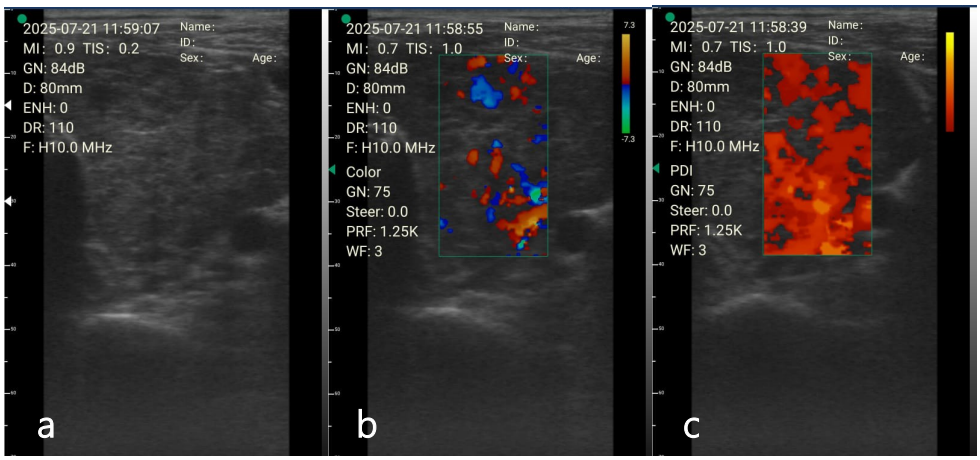

A 30-year-old lady presented with a four-week history of palpitations and unintentional weight loss. On clinical examination, she was tachycardic with heart rate of 114 beats per minute (regularly regular). She had a large diffuse smooth non-tender goitre with bruits on auscultation and bilateral exophthalmos with full range of eye movement. Blood investigations showed deranged thyroid function tests in keeping with primary hyperthyroidism (elevated free T4 of 34.5 pmol/L, free T3 of 14.01 pmol/L and suppressed TSH <0.008 IU/mL). A subsequent thyroid receptor antibody was also raised at 15.2 IU/L. She was started on carbimazole 30mg once a day and propranolol 20mg twice a day. A bedside ultrasound (Point-of-care ultrasound—POCUS) the thyroid was done and is shown in **Figure 1** (**a**; mode, **b**; Colour doppler and **c**; Power Doppler).

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This patient has hyperthyroidism secondary to Graves disease. The ultrasound images of colour and power Dopplers showed increased vascularity within the thyroid parenchyma in both arterial and venous flow signals with intense, chaotic vascular signals with high-velocity interspersed with low-resistance blood flow.[1] This pattern seen within thyroid parenchyma resembles flame pulsatile pattern or an "inferno", hence the term "thyroid inferno". It is classically seen in Graves' disease. The pathophysiology of thyroid inferno lies in the upregulation of angiogenic factors, leading to hyperplasia of follicular cells and increased vascularity.[1,2] Thus the thyroid gland appears enlarged with coarse, heterogenous echotexture on ultrasound imaging, creating a different contrast compared to a non-diseased thyroid (**Figure 2**). The inferno pattern also correlates highly to the biochemical markers of hyperthyroidism, with increased patterns in elevated levels of free T3 and free T4 levels.[1,3]

On the other hand, a homogenous texture of the thyroid parenchyma with well-defined margins is typically seen in ultrasound of a normal thyroid gland (**Figure 2a**). There are no hypoechoic patches or nodules. **Figure 2b**, a colour Doppler image, demonstrates a few red and blue spots within the parenchyma, representing a normal low-grade vascularity. **Figure 2c** shows a few scattered red signals, suggestive of normal low-flow intrathyroidal vascularity. The distribution is sparse and focal, as expected in a non-diseased thyroid gland.

Treatment of Graves' disease involves thionamides and consideration of radioactive iodine ablation. This patient was initiated on carbimazole and propranolol. Her hyperthyroidism improved. With regression of hyperthyroid state, the thyroid vascularity typically lessens and thyroid inferno may disappear.

Abbreviations

TSH	Thyroid stimulating hormone
POCUS	Point of care ultrasound

Declarations

Patient Consent

Patient consent has been obtained.

Disclosure and Conflict of Interest

The authors declare that they have no conflicts of interest and no financial disclosures relevant to this case report.

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References

1. Ralls PW, Mayekawa DS, Lee KP, Colletti PM, Radin DR, Boswell WD, et al. Color-flow Doppler sonography in Graves disease: "thyroid inferno". AJR Am J Roentgenol 1988;150:781–4.
2. Vita R, Di Bari F, Perelli S, Capodicasa G, Benvenga S. Thyroid vascularization is an important ultrasonographic parameter in untreated Graves' disease patients. J Clin Transl Endocrinol 2019;15:65-9.
3. Ushakov AV. Thyroid ultrasound pattern in primary hypothyroidism similar to Graves' disease: a report of three cases. J Med Life 2024;17:116-22.

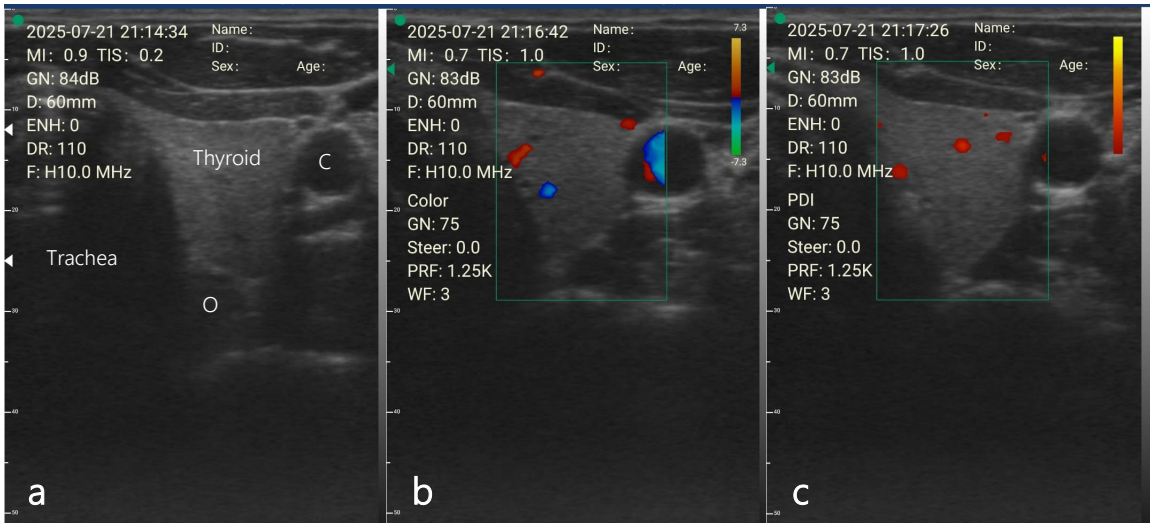

Figure 2: POCUS images of a normal thyroid with a) normal echotexture, b) normal Colour doppler and c) normal Power doppler. C - common carotid artery and O - oesophagus.